1998 Purple Loosestrife Survey and Control Activities

by

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This report summarizes the results of purple loosestrife survey and control work accomplished by GLIFWC Wildlife Section staff during 1998. The introduction presents a brief overview of purple loosestrife ecology, history, and its threat to native wetland communities. Chapter 1 reports the distribution of purple loosestrife in the northeast portion of the 1842 ceded territory in Wisconsin. Chapter 2 documents loosestrife control activities undertaken on the Bad River-Chequamegon Bay watershed and the Chippewa Flowage.

INTRODUCTION

Purple loosestrife (*Lythrum salicaria*) was introduced into the United States in the early 1800's via ship ballast exchange, livestock bedding and forage, beekeepers, and as a medicinal herb by early settlers (Thompson et al. 1987). It spread rapidly through the eastern United States following travel corridors, primarily highways and waterways. Since then it has continued to spread westward and is now found throughout the ceded territories of Minnesota, Wisconsin, and Michigan (Fig. 1).

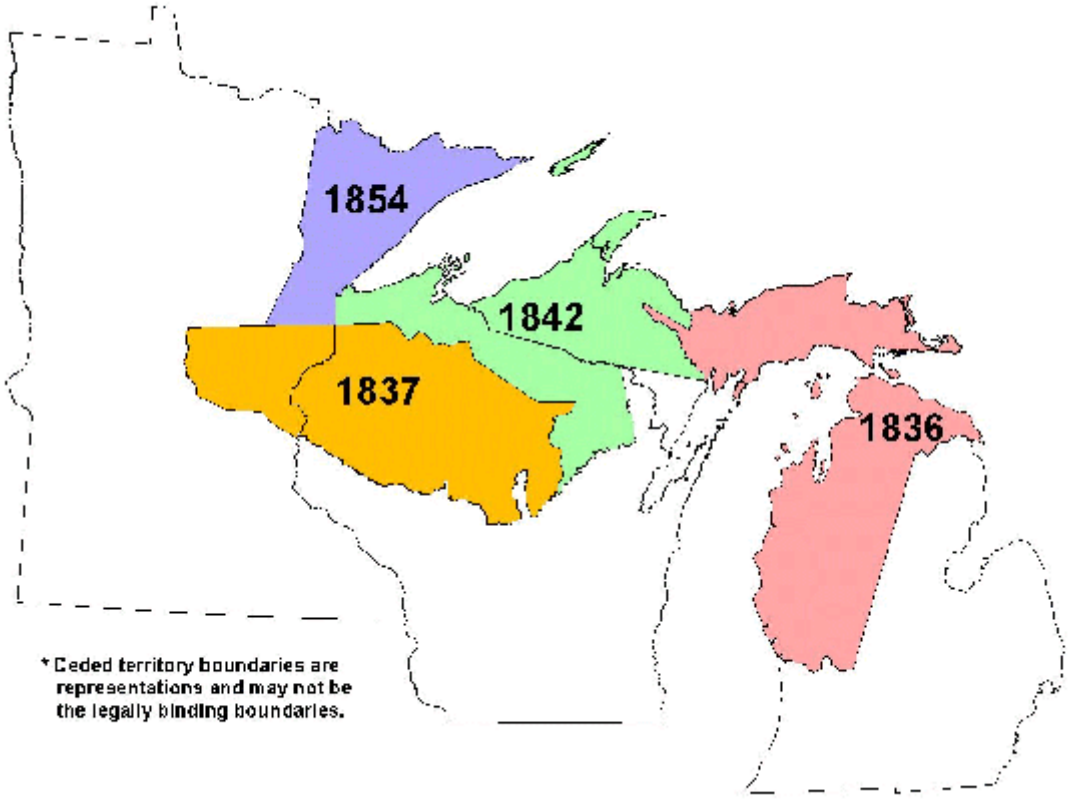

Figure 1. Ceded territories in Minnesota, Wisconsin, and Michigan.

Purple loosestrife is an herbaceous perennial that prefers aquatic or wetland habitats. A mature plant can grow to be 2.5m tall and anywhere from 30 to 50 stems can arise from a common rootstock. Root crowns can grow up to 0.5m in diameter. Reproduction is either vegetative or sexual, but seed production is the main avenue of plant dispersal. Blooming occurs from late July to early September in northern Wisconsin, with mature plants capable of producing over 2 million seeds annually. The principle route of seed dispersal is by floating on open water, however, long distance dispersal is also possible by seeds that become embedded in animal fur or feathers, truck or ATV tires, outboard engines or live wells, and boat trailers. Any moist exposed soil receiving diffuse sunlight provides favorable conditions for the germination of purple loosestrife seeds (Shamsi and Whitehead 1974). Germination sites are most often associated with recent disturbances that expose the soil. Some examples of disturbances are road construction, reduction of water levels, and roadside mowing.

Healthy wetland ecosystems are characterized by a diversity of plant species and habitat structure. Alternating patches of thick vegetation and open water provide both food and cover for a diverse array of terrestrial and aquatic wildlife. Early observations have linked purple loosestrife to degraded water bird production sites (McKeon 1959). Loss of open water, mud flats, and wildlife food plants were observed ecological consequences of loosestrife invasion into wetland communities (Rawinski and Malecki 1984). Because it lacks the natural control mechanisms found in its native habitat, purple loosestrife thrives in North America. Once established, purple loosestrife has the ability to out-compete native plant species in wetland habitats and form dense monotypic stands. Prevention of loosestrife colonization and control of loosestrife infestations are necessary to maintain the health of native wetland ecosystems.

CHAPTER 1

PURPLE LOOSESTRIFE SURVEY IN THE EASTERN PORTION OF THE 1842 CEDED TERRITORY IN WISCONSIN

The eastern half of the 1842 ceded territory in Wisconsin is important for controlling the spread of the water-dispersed exotic purple loosestrife because numerous watersheds originate here and 3 major watersheds converge just north of this region: 1) Wisconsin River, 2) Lake Superior, and 3) Lake Michigan (Figure 2). The primary objective of the 1998 survey was to determine the current distribution of purple loosestrife throughout this region. A secondary objective was to quantify and describe (areal extant, density, and potential for spreading) each colony. By establishing a baseline of locations, and relative severity of infestations in the north east counties of Wisconsin, future control efforts can be effectively directed and prioritized.

METHODS

Prior to initiating field inspections purple loosestrife locations were initially mapped based on information submitted by local contacts (Appendix 1) and data from a 1987 WIDNR survey (Brock Woods, WIDNR, unpubl. data). USGS topographic maps were obtained and key areas were copied for field use. Once a potential site was located on a map, routes of seed dispersal (e.g. connecting waterways and roads) and potential colonizations sites (e.g. adjacent wetlands and disturbance-prone sites) were identified for field inspection. Data collected included county, legal description, and extent of infestation. Each site was mapped and numbered for future reference. Area of infestation was determined by ocular estimation. Potential dispersal routes and nearby wetland communities perceived to be at risk of colonization were also surveyed. Observations were made from a truck, bike, canoe, or foot depending on terrain and were assisted by using binoculars when appropriate.

RESULTS

The total area of purple loosestrife found during this survey was estimated to be >3350m^2. Figure 2 illustrates the distribution and area of loosestrife colonies located and the routes surveyed during the 1998 survey. Table 1 summarizes the sites located during this survey and provides a key to the sites illustrated in figure 2.

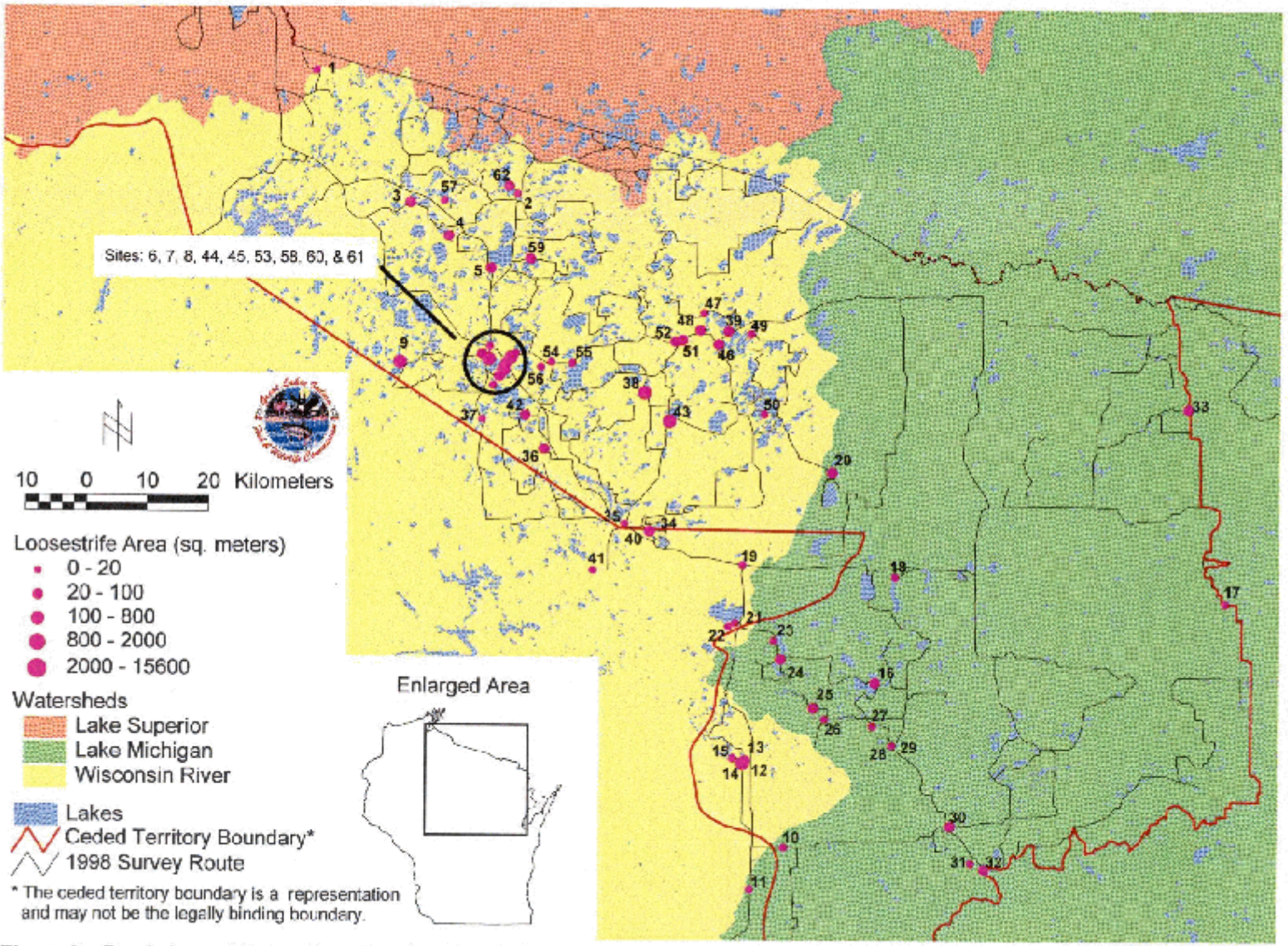

Figure 2. Purple loosestrife locations found during 1998 survey of 1842 ceded territory.

Table 1. Summary of locations and areal extant of purple loosestrife populations located during 1998 survey of the 1842 ceded territory in northeast Wisconsin.

ID*	County	T	R	S	1/4 Sect.	Area (m^2)	Notes
1	Iron	44N	3E	12	SW	0.1	1 plant ; hand pulled
2	Vilas	42N	7E	17		4	Manitowish R.; downstream of bridge
3	Vilas	42N	5E	21	NENE	30	Powell Rd.; W side; in marsh of Three Stones L.
4	Vilas	42N	6E	6	SE	50	Wild Rice L. and Trout R. junction; marsh area N infested as well.
5	Vilas	41N	6E	24	SW	40	Swamp next to Hwy. 51; S of boat launch
6	Oneida	39N	6E	10	W ½	50	Swamp N of Bull Head L.; ditches along Hwy. 70
7	Oneida	39N	6E	24	E ½	300	Boat ramp off Thoroughfare Rd.; along marsh; towards Mud Lk and Tomahawk L.; leaf damage from biocontrol evident.
8	Oneida	39N	7E	7, 8		150	Intersect. Woodruff Rd. & Woodruff Dr; along S shoreline of Woodruff Hatchery.
9	Oneida	39N	5E	5, 8, 19		370	W shoreline of Squirrel Lk; few in E shore.
10	Langlade	31N	11E	23	NWNE	3	Cultivated; Cnty BB & Meadow Rd.
11	Langlade	30N	11E	10	NE	3	cultivated; E. side of Hwy 45
12	Langlade	32N	11E	6	SENW	150	Swamp on W. side of Cnty B.
13	Langlade	32N	11E	6	NENE	50	Boat landing at Kimball L.
14	Langlade	32N	10E	1	N ½	3	S side of Cnty J; W of Cnty B.
15	Langlade	33N	10E	36	S ½	3	N side of Cnty J; W of Cnty B.
16	Langlade	34N	13E	29	E ½	70	Intersect. of Forest Ln. & Pickerel Lk Rd.
17	Marinette	35N	19E	17	NW	10	Disturbance from construction
18	Forest	36N	13E	34	SE	20	Potowatomi Rd.; near L. Lucerne.

*Refer to figure 2.

Table 1. (Continued)

ID*	County	T	R	S	1/4 Sect.	Area (m^2)	Notes
19	Oneida	36N	11E	30	NE	15	S of Venus Lk; Hwy 8 & Hwy 47
20	Forest	37N	12E	3	S ½	30	Hiles Mill Pond; headwaters to the Wolf R.
21	Oneida	35N	10E	25	SE	3	Cultivated in yard off Cnty G
22	Oneida	35N	10E	26	SW	1	Along ditch at intersect. of Elcho Rd. & Cnty G
23	Langlade	34N	11E	3	NWNE	1	1 plant; hand pulled.
24	Langlade	34N	11E	14	NW	100	Standing water; downstream of dam
25	Langlade	33N	12E	5	SW	25	Banks of Pickerel creek off Cnty T bridge.
26	Langlade	33N	12E	16	NE	10	Wolf R.; Cnty A bridge; up and downstream.
27	Langlade	33N	13E	17	SE	5	Wolf R.; Memorial Park off Hwy 55; on island and banks.
28	Langlade	33N	13E	27	SW		Wolf River; off Hwy. 52; ½ mile W of Hwy. 55
29	Langlade	33N	13E	27	SE	5	Lily R.; a Wolf R. tributary. observed from bridge off Hwy. 55.
30	Langlade	31N	14 E	310		100	Wolf R.; off Hwy 64 bridge; near public access.
31	Langlade	31N	14 E	25	SE	5	Old site of Gardner Dam
32	Langlade	31N	15 E	31	SW	100	Wolf R.; off Cnty M bridge; W of Hwy. 55.
33	Florence	38N	18 E	3	NE	50	½ mi. W of Cnty N; Cnty C roadside
34	Oneida	36N	9 E	16	N ½	25	N roadside of Hwy. 8.
35	Oneida	36N	8 E	1 & 12		200	Wisconsin R. banks in Rhinelander
36	Oneida	38N	7 E	35	NW	40	Tributary to the Wisconsin R.; near Woodruff
37	Oneida	38N	6 E	11	SW	1	Shoreline of Katherine L.
38	Oneida .	39N	9 E	33	NE	200	Shoreline of channel connecting Chain L. & Echo L.

* Refer to figure 2.

Table 1. (Continued)

ID*	Cnty	T	R	S	1/4 Sect.	Area (m^2)	Notes
39	Oneida	40N	10 E	25	E ½	50	Catfish L.; standing water
40	Oneida	37N	9 E	32	NW	1	Cultivated in yard; Rhinelander
41	Oneida	36N	8 E	27	SW	10	Wisconsin R.; downstream of Hat Rapids Dam; standing water.
42	Oneida	38N	7 E	9	W ½	40	Roadside of Cnty D; next to Little Carr L.
43	Oneida	38N	9 E	13	NW	150	Hwy. 17 bridge; Bass L. shoreline and roadside.
44	Oneida	39N	7 E	18	N ½	100	Hwy. 47 bridge; on the shores of L. Minocqua
45	Oneida	39N	6 E	25	E ½	2	Intersect. of Camp Rd and Tomahawk L. Rd
46	Oneida	40N	10E	35		100	Shoreline of Catfish L.
47	Oneida	40N	10E	16	SE	10	Roadside
48	Oneida	40N	10E	28		100	Eagle R.; along shores and in town of Eagle River
49	Oneida	40N	11E	29	SW	20	Roadside and adjacent swamp.
50	Oneida	38N	11E	9	NE	20	Roadside across from Connors Rd intersect.
51	Oneida	40N	10E	31	SW	40	Visible from bridge on Wisconsin River banks.
52	Oneida	40N	9E	36	SE	40	Visible from bridge on Wisconsin River banks.
53	Oneida	39N	7E	8	NE	2	Off Cnty J; near campgrounds
54	Oneida	39N	8E	12	SW	5	Campground
55	Oneida	39N	8E	17	NW	20	In swamp adjacent to road.
56	Oneida	39N	7E	14	SW	20	Sweeny L. boat landing.
57	Vilas	42N	6E	20	NW	1	Island L. boat landing
58	Oneida	39N	6E			75	Downtown and along shoreline; Minocqua

* Refer to figure 2.

Table 1. (Continued)

ID*	Cnty	T	R	S	1/4 Sect.	Area (m^2)	Notes
59	Vilas	41N	7E	15	SW	50	Big Muskellunge L. shoreline.
60	Oneida	40N	6E	35	S ½	2	Yard
61	Oneida	39N	7E	18	E ½	200	Shoreline of Mud L.
62	Vilas	42N	7E	8	SW	50	Boat landing at Boulder L.

* Refer to figure 2.

DISCUSSION

Loosestrife occurrence was greatest in the "lake country" of Vilas and Oneida counties where heavy recreational boat traffic contributes to dispersal. In addition, lack of precipitation in 1998 and fluctuating water levels along the impoundments in this region created optimal growing conditions for purple loosestrife in 1998 by exposing moist soils required for germination.

The distribution of purple loosestrife discovered during the 1998 survey was similar to that recorded in a 1987 survey (Brock Woods, WIDNR, unpubl. data). Although some sites reported in 1987 did not have loosestrife in 1998. It is suspected that these sites were misidentified in the 1987 survey because no significant purple loosestrife control programs have been initiated. Although some control and educational efforts are ocurring. For example, the Turtle Flambeau flowage is surveyed and treated by hand on an annual basis by WIDNR staff (Bruce Bacon, WIDNR, pers. commun.) In addition, leaf damage and herbivorous beetles were found on plants near Thoroughfare Rd. in Minocqua (Site #7). These beetles were released by the WIDNR in 1996 (Pat Coffin, WIDNR, pers. commun.). Warning signs were also observed at some boat landings (Twin Lakes; WI River headwaters) advising boaters of the potential for spreading this invasive plant.

The data from this survey will be pooled with data from the western UP in Michigan (Gilbert et al. 1998) and the Bad River-Chequamegon Bay watershed (Gilbert et al. 1995) to develop a regional purple loosestrife management plan. This plan will outline a regional purple loosestrife control strategy, assign priorities to specific loosestrife populations, and recommend site-specific treatment methods.

Successful control of purple loosestrife in northeast Wisconsin and the Upper Great Lakes Region will require an aggressive, directed, and coordinated control program. Toward this end, GLIFWC (in cooperation with the Natural Resouces Conservation Service and Northland College) is establishing a web page with an interactive GIS interface. This technology will facilitate inter-agency coordination by providing on-line access to GLIFWC's purple loosestrife spatial data base, and allow users to view, query, download, and submit data. The database can be accessed at: http://www.glifwc.org

CHAPTER 2

CONTROL ACTIVITIES IN THE BAD RIVER - CHEQUAMEGON BAY WATERSHED

Purple loosestrife populations within the Bad River - Chequamegon Bay watershed were inventoried in 1994 and 1995 (Gilbert et al. 1995, Edblom et al. 1995). Spatial data from these surveys were used to prioritize control efforts based on the size of loosestrife populations, location within the watershed, and their potential to infest undisturbed wetlands. Based on these criteria, the Highbridge area, the highway 13 corridor between Highbridge and Washburn, and the Kakagon Sloughs were assigned high priority for control.

Methods

Efforts were focused primarily on clean up in Fish Creek Sloughs, continued control efforts on Whittlesey Creek, control of loosestrife along highway 13 between Highbridge and Washburn, and assistance to the Bad River Band in Kakagon Sloughs. The Nature Conservancy (TNC) agreed to undertake control efforts on private uplands in the Highbridge area, however, GLIFWC staff continued to treat road-side ditches, Silver Creek, and other wetlands near Highbridge.

The loosestrife control crew (1 crew leader and 4 workers) worked for 6 weeks in 1998 beginning the last week in July. Control activities were conducted using back pack sprayers. Glyphosate was used in very dense stands or over-water, while triclopyr was used on road-side ditches and some old fields.

The spatial data collected during the surveys of 1994 and 1995 were used to quantify the progress of control efforts. Treated loosestrife patches were identified on maps and coded for control in 1998. Summary statistics of treated patches were determined with ArcView GIS (ESRI, Redlands CA).

Results

A total of 268 acres of purple loosestrife were sprayed with herbicide in 1998 (Table 2). Approximately 90% (55 patches comprising ~ 249 acres) of loosestrife control work occurred off-reservation within the Bad River - Chequamegon Bay watershed. Most of the off-reservation herbicide application was conducted along the highway 13 right-of-way, but several acres of purple loosestrife near Whittlesey and Fish Creek were also treated (Figure 3).

Only 8 patches (~ 20 acres) of loosestrife were sprayed on the Bad River Reservation (Table 2). These 8 patches represent only 9% of the on-reservation loosestrife patches and 14% of the on-reservation loosestrife acreage.

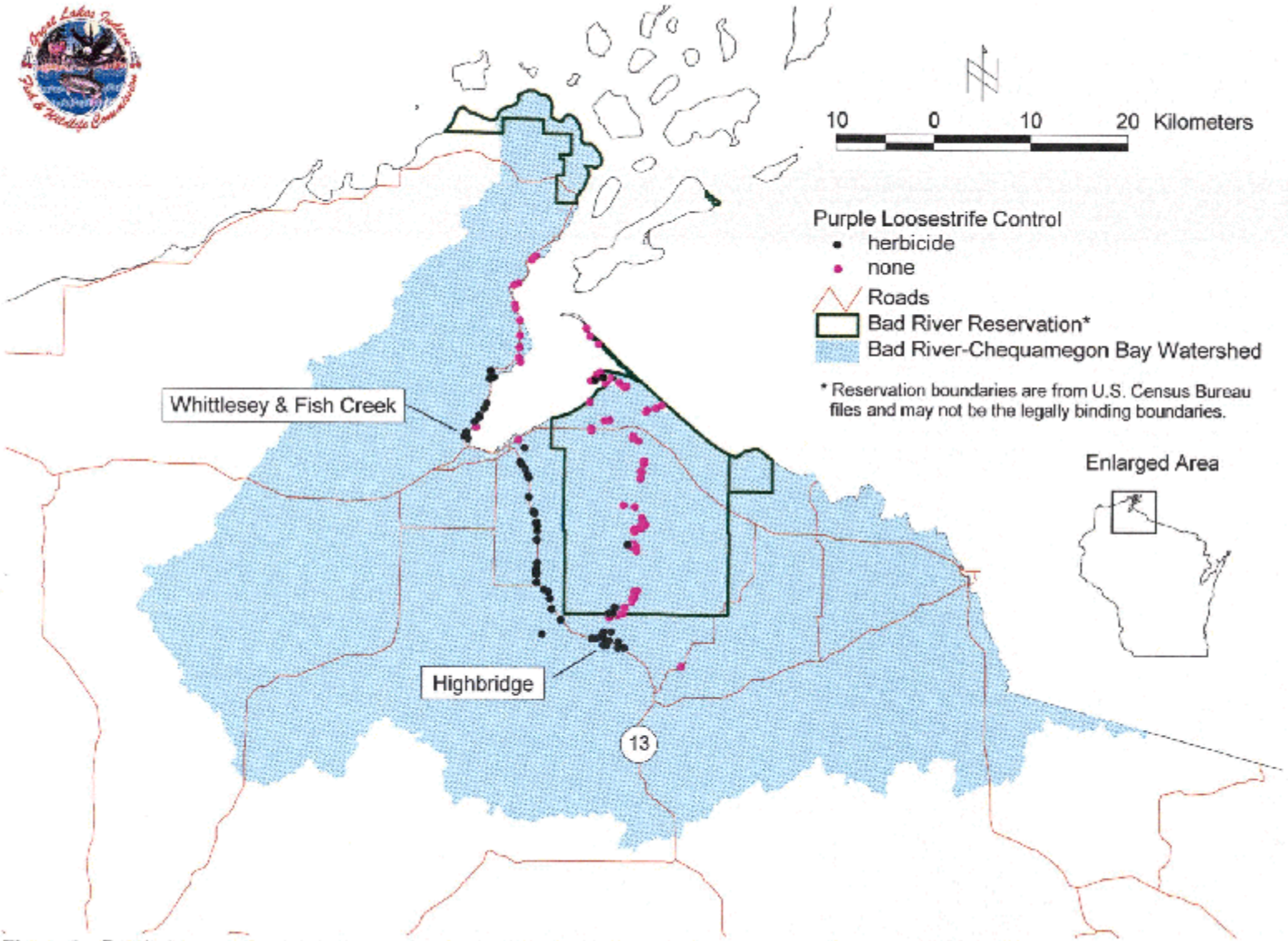

Figure 3. Purple loosestrife distribution and control within the Bad River-Chequamegon Bay watershed, 1998.

Table 2. Summary of purple loosestrife control activities within the Bad River - Chequamegon Bay watershed in 1998.

Location	Control Technique	Patches	Acres
Bad River Reservation	Herbicide	8	19.3
	None	80	108.6
Off-Reservation	Herbicide	55	248.6
	None	14	12.5
Totals	Herbicide	63	267.9
	None	94	121.1

Discussion

Much progress has been made in the control of loosestrife in the off-reservation portion of the Bad River - Chequamegon Bay watershed. Most loosestrife populations have been treated and only a few locations north of Washburn remain completely untreated. However, it must be stressed that several years of treatment are required to eliminate loosestrife from an area. Most of the patches treated in 1998 will need to be retreated in the coming years. More work remains to be accomplished on the Bad River Reservation, but this work is appropriately conducted by the Bad River Tribe.

Control activities on the Chippewa Flowage, Sawyer County.

In 1997 the Great Lakes Indian Fish and Wildlife Commission in conjunction with Lac Courte Oreilles Ojibwa Community College inventoried purple loosestrife colonies in the Chippewa Flowage (Gilbert, in prep). There were 145 populations of loosestrife located on the flowage that covered a total of 35.6 acres. The infestation was judged to be at a pioneering stage and controllable based on the size of plants found, their distribution, and the density of individual colonies.

The Lac Courte Oreilles Tribe had a policy banning the use of chemical herbicides on reservation lands. However, because GLIFWC staff had demonstrated that chemical control can be extremely effective, the LCO governing board agreed to a proposal to conduct experimental control work that compared the relative effectiveness of chemical herbicides to biocontrol agents (herbivorous beetles of the genus *Galerucella*). The objectives of this study were to assess over-winter survival of insect herbivores in different bottom substrates, determine extent of control exerted by both beetles and herbicides, and document any unanticipated consequences of either control technique.

A 3 person crew was hired for the summer from students enrolled in the Natural Resources

Program at the LCO Ojibwa Community College. The crew chose experimental sites from among the loosestrife populations surveyed in 1997. Sites with different bottom substrates (upland-dry, sand-standing water, and muck-standing water) were chosen to evaluate their influence on overwinter survival of herbivorous beetles. Each site was permanently marked and mapped (Figure 4). Beetlese were released at Rudy's Island (sand-standing water), Jame's Lake (upland-dry), and Bog 31(muck-standing water). Glyphosate was applied with backpack sprayers to plots at Jame's Lake, Rudy's Island, and Bog 102(muck-standing water). Glyphosate was applied with daubing bottles after flowering stalks were removed at Jame's Lake and Bog 103(muck-standing water). Within each respective treatment area, 5 plots (1 m^2) were established to evaluate each technique. All loosestrife plants within plots were classified to growth stage (Thompson et al. 1987) and counted prior to treatment (Table 3). These measurements will be repeated annually to gauge the effectiveness of each treatment.

In addition to the experimental plots, 32 populations of loosestrife on the LCO reservation and 25 off-reservation sites (state-owned land) were treated with herbicide (Figure 4). Approximately 11 acres of loosestrife were treated on the Chippewa Flowage (Table 4). This represents about 1/3 of the loosestrife acreage and 22% of the loosestrife patches that were inventoried in 1997.

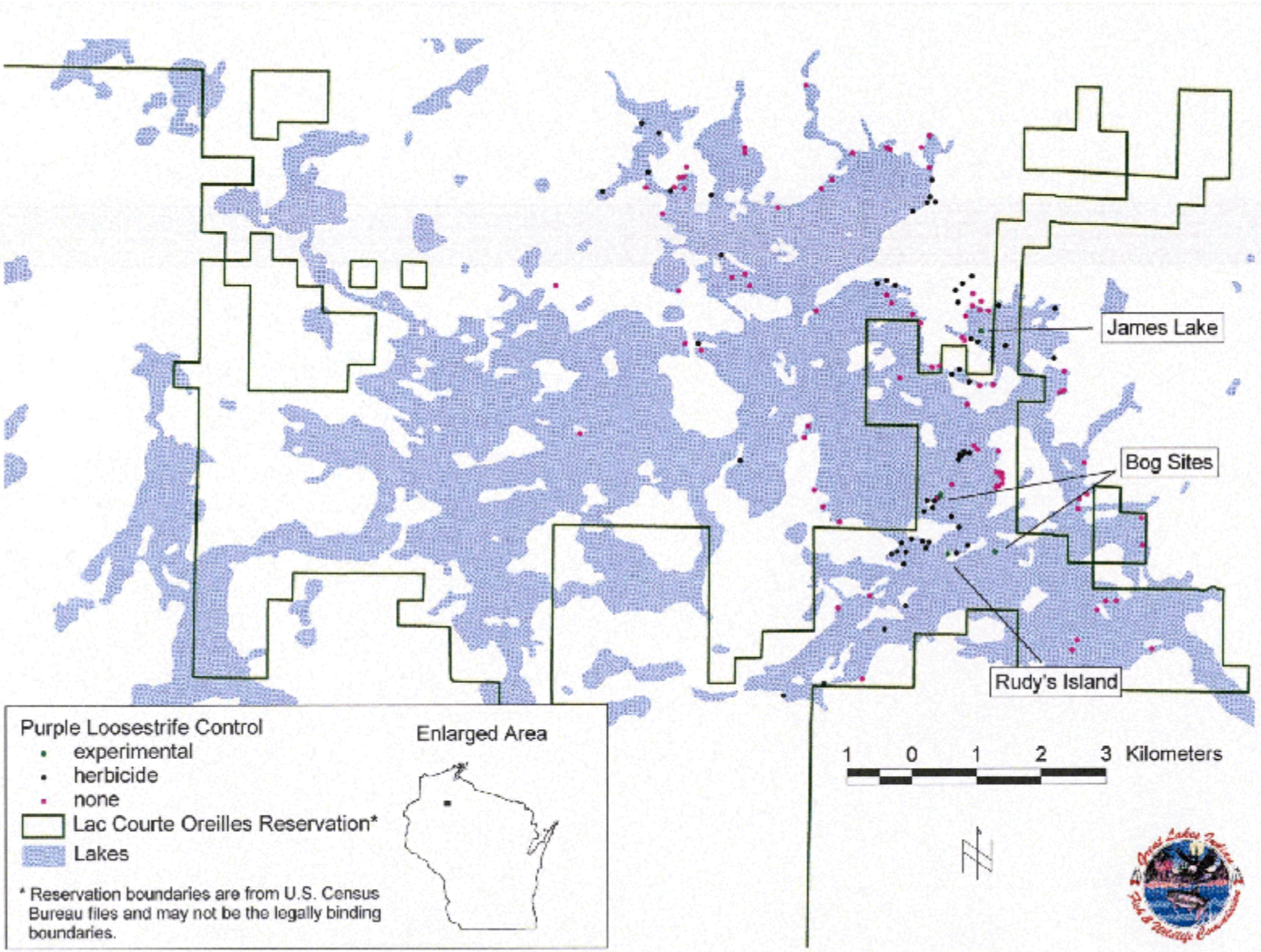

Figure 4. Purple loosestrife distribution and control on the Chippewa Flowage, Sawyer County, Wisconsin, 1998.

Table 3. Number of purple loosestrife plants in each stage class per test plot at 3 sites on the Chippewa Flowage, Sawyer County, Wisconsin. Stage classes follow Thompson et al. (1987).

Site	Substrate	Control Method	Plot #	Class			Total
				I	II	III	
James Lake	Upland-Dry	Biocontrol	1b	8	1	2	11
		Biocontrol	2b	1	1	1	3
		Biocontrol	3b	1	0	3	4
		Biocontrol	4b	0	0	1	1
		Biocontrol	5b	16	1	1	18
		Herbicide - Spray	1s	1	0	2	3
		Herbicide - Spray	2s	7	0	0	7
		Herbicide - Spray	3s	9	1	1	11
		Herbicide - Spray	4s	3	1	1	5
		Herbicide - Spray	5s	3	1	0	4
		Herbicide - Daub	1d	0	0	1	1
		Herbicide - Daub	2d	0	0	1	1
		Herbicide - Daub	3d	0	2	0	2
		Herbicide - Daub	4d	6	0	3	9
		Herbicide - Daub	5d	14	6	5	25
Rudy's Island	Sand-Standing Water	Biocontrol	1b	4	1	0	5
		Biocontrol	2b	30	0	0	30
		Biocontrol	3b	56	5	0	61
		Biocontrol	4b	25	1	1	27
		Biocontrol	5b	3	0	2	5
		Herbicide - Spray	1s	8	0	2	10
		Herbicide - Spray	2s	3	0	1	4
		Herbicide - Spray	3s	7	0	3	10
		Herbicide - Spray	4s	12	0	0	12
		Herbicide - Spray	5s	18	0	3	21

Table 3. (Continued)

Site	Substrate	Control Method	Plot #	Class			Total
				I	II	III	
Bog 31	Muck-Standing Water	Biocontrol	1b	25	2	0	27
		Biocontrol	2b	3	0	5	8
		Biocontrol	3b	3	1	2	6
		Biocontrol	4b	10	1	1	12
		Biocontrol	5b	0	0	3	3
Bog 102	Muck-Standing Water	Herbicide - Spray	1s	14	3	2	19
		Herbicide - Spray	2s	10	3	3	16
		Herbicide - Spray	3s	10	2	1	13
		Herbicide - Spray	4s	10	3	2	15
		Herbicide - Spray	5s	5	0	1	6
Bog 103	Muck-Standing Water	Herbicide - Daub	1d	4	1	1	6
		Herbicide - Daub	2d	5	0	1	6
		Herbicide - Daub	3d	9	1	2	12
		Herbicide - Daub	4d	40	0	0	40
		Herbicide - Daub	5d	8	2	1	11

Table 4. Number of patches and acreage of purple loosestrife treated on LCO reservation and off-reservation lands in the Chippewa Flowage, 1998.

Location	Control Technique	Patches	Acres
LCO Reservation	Herbicide	32	2.1
	Biocontrol	5	<1
	None	29	18.1
Off-Reservation	Herbicide	25	9.0
	Biocontrol	0	0
	None	54	6.5
Totals	Herbicide	57	11.1
	Biocontrol	5	<1
	None	83	24.6

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APPENDIX 1

Contact List

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